

Application No. 10/711,364
Technology Center 1775
Amendment dated September 21, 2006
Reply to Office Action dated June 21, 2006

RECEIVED
CENTRAL FAX CENTER
SEP 21 2006

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (Currently amended): A thermal barrier coating on a surface of a substrate, the thermal barrier coating being formed of at least one ceramic material and having a columnar microstructure comprising columns extending from the surface of the substrate, the columns having inner regions contacting the surface of the substrate, outer regions near an outermost surface of the thermal barrier coating, and interior regions therebetween, the inner regions of the columns being substantially normal to the surface of the substrate and ~~at least one of the interior and outer regions of the columns comprising multiple first portions substantially normal to the surface of the substrate and multiple second portions separated by the first portions and not normal to the surface of the substrate being nonaligned with their respective inner regions~~ so that the columns of the columnar microstructure are continuous but modulated within the interior regions ~~between the inner and outer regions~~ to reduce tensile stresses within the columns resulting from particle impact such that cracking of

Application No. 10/711,364
Technology Center 1775
Amendment dated September 21, 2006
Reply to Office Action dated June 21, 2006

the columns from particle impact is more likely to occur within the outer regions of the columns as compared to the inner regions of the columns.

Claim 2 (Original): A thermal barrier coating according to claim 1, wherein the thermal barrier coating is characterized by the substantial absence of columns that are discontinuous between the surface of the substrate and the outermost surface of the thermal barrier coating, whereby the inner, interior and outer regions are not discrete layers and are not separated by distinct interfaces.

Claim 3 (Original): A thermal barrier coating according to claim 1, wherein adjacent pairs of the columns are substantially equally spaced from each other along the inner, interior and outer regions thereof.

Claim 4 (Original): A thermal barrier coating according to claim 1, wherein the surface of the substrate is defined by a metallic bond coat that promotes adhesion of the thermal barrier coating to the substrate.

Claim 5 (Original): A thermal barrier coating according to claim 1, wherein the ceramic material within the inner, interior and outer regions has the

Application No. 10/711,364
Technology Center 1775
Amendment dated September 21, 2006
Reply to Office Action dated June 21, 2006

same composition.

Claim 6 (Original): A thermal barrier coating according to claim 5, wherein the ceramic material consists essentially of zirconia and yttria.

Claim 7 (Original): A thermal barrier coating according to claim 1, wherein the ceramic material of at least one of the inner, interior and outer regions is chosen from the group consisting of ceramic materials having a lower thermal conductivity than zirconia stabilized by seven weight percent yttria, ceramic materials having greater CMAS-resistance than zirconia stabilized by seven weight percent yttria, and ceramic materials having greater erosion resistance than zirconia stabilized by seven weight percent yttria.

Claim 8 (Original): A thermal barrier coating according to claim 1, wherein the substrate is a gas turbine engine component.

Claim 9 (Original): A thermal barrier coating according to claim 8, wherein the component is a turbine blade.

Claim 10 (Original): A thermal barrier coating according to claim 8,

Application No. 10/711,364
Technology Center 1775
Amendment dated September 21, 2006
Reply to Office Action dated June 21, 2006

wherein the component is a vane.

Claim 11 (Original): A thermal barrier coating according to claim 10, wherein the surface of the substrate is a leading edge of the component.

Claim 12 (Currently amended): A coating system on a surface of a gas turbine engine component, the coating system comprising a bond coat on the surface and a thermal barrier coating on the bond coat, the thermal barrier coating being formed of a ceramic material and having a columnar microstructure comprising columns extending from the surface of the component, the columns having inner regions contacting the surface of the component, outer regions at an outermost surface of the thermal barrier coating, and interior regions therebetween, the ceramic material within the inner, interior and outer regions substantially having the same composition, the inner regions of the columns being substantially normal to the surface of the substrate and ~~at least one of the interior and outer~~ regions of the columns comprising multiple first portions substantially normal to the surface of the substrate and multiple second portions separated by the first portions and not normal to the surface of the substrate ~~being nonaligned with their respective inner regions~~ so that the columns of the columnar microstructure are

Application No. 10/711,364
Technology Center 1775
Amendment dated September 21, 2006
Reply to Office Action dated June 21, 2006

continuous but modulated within the interior regions ~~between the inner and outer regions~~ to reduce tensile stresses within the columns resulting from particle impact such that cracking of the columns from particle impact is more likely to occur within the outer regions of the columns as compared to the inner regions of the columns.

Claim 13 (Original): A coating system according to claim 12, wherein the thermal barrier coating is characterized by the substantial absence of columns that are discontinuous between the surface of the component and the outermost surface of the thermal barrier coating, whereby the inner, interior and outer regions are not discrete layers and are not separated by distinct interfaces.

Claim 14 (Original): A coating system according to claim 12, wherein adjacent pairs of the columns are substantially equally spaced from each other along the inner, interior and outer regions thereof.

Claim 15 (Original): A coating system according to claim 12, wherein the ceramic material consists essentially of zirconia and yttria.

Application No. 10/711,364
Technology Center 1775
Amendment dated September 21, 2006
Reply to Office Action dated June 21, 2006

Claim 16 (Original): A coating system according to claim 12, wherein the ceramic material of at least one of the inner, interior and outer regions is chosen from the group consisting of ceramic materials having a lower thermal conductivity than zirconia stabilized by seven weight percent yttria, ceramic materials having greater CMAS-resistance than zirconia stabilized by seven weight percent yttria, and ceramic materials having greater erosion resistance than zirconia stabilized by seven weight percent yttria.

Claim 17 (Original): A coating system according to claim 12, wherein the component is a turbine blade.

Claim 18 (Original): A coating system according to claim 12, wherein the component is a vane.

Claim 19 (Original): A coating system according to claim 12, wherein the surface of the component is a leading edge of the component.

Claims 20-43 (Canceled)